I, Wendy Elizabeth LIGHT BA, MA, PgDip. Trans.,
translator to RWS Group Ltd, of Europa House, Marsham Way, Gerrards Cross, Buckinghamshire, England, do solemnly and sincerely declare that I am conversant with the English and German languages and am a competent translator thereof, and that to the best of my knowledge and belief the following is a true and correct translation of the amended sheets of the PCT Application filed under No. PCT/CH2003/000387.

Date: 18 November 2004

W. E. LIGHT
For and on behalf of RWS Group Ltd

System for packaging a flexible web, in particular a textile web, which is positioned in zigzag-form loops

Technical Field

The invention relates to a system for packaging a flexible web, in particular a textile web, which is positioned in zigzag-form loops, according to the preamble of claim 1.

Prior Art

EP 0 062 753 B and EP 0 778 236 A disclose a system of the type mentioned in the introduction in the case of which a flexible web, in particular a textile web, is positioned in zigzag-form loops and an arrangement of web loops is thus formed. The resulting web-loop arrangements are stacked manually and packaged into a packaging container and then processed further in the textile industry. For this purpose, the web-loop arrangements have to be stacked manually in a packing shaft, that is to say they have to be transferred manually into the packaging shaft by operators, and an arrangement of web loops is thus formed, via push-off plates. The operations of determining the number of web loops per arrangement and of separating the web loops in a precise and defined manner between the respectively bottom and top planes are difficult to automate on account of the random positioning of the textile web loops and of the sensitivity of the web-loop arrangements to pressure. Such web-loop arrangements are generally difficult to handle since they are subjected to a high level of internal stressing at the folds and thus tend to deform easily because, at the folds, the web tries to return into the straightened-out position again. The operator thus lines the packing shaft with a paper sheet prior to the first web-loop arrangement being introduced. Once the desired web length has been achieved, in the first

instance, the group as a whole has the paper sheet wrapped around it and this paper sheet is fixed with adhesive tape in order that the web-loop arrangements do not come apart. It is only then that the group as a whole can be removed from the packing shaft and deposited in a packaging container.

US 6 321 512 B discloses a system which is intended for packaging a flexible web positioned in zigzag-form loops and in the case of which a vertically fed length of material is cut into individual webs in the first instance, these webs then being positioned together in loops and the web loops being jointly introduced vertically into a container which is fitted over them. No indication is given here of the possibility of using the system to form, on a horizontal bearing panel, a web-loop arrangement of predeterminable magnitude which could then, moreover, be transferred into a packaging container.

Description of the Invention

The object of the invention is to improve the system mentioned in the introduction.

The object is achieved by the characterizing features of claim 1. Since the positioning device is assigned a transfer device which can produce a web-loop arrangement of predeterminable magnitude and which allows the web-loop arrangement produced to be transferred directly or indirectly into a packaging container, a memory-programmable control device controlling components of the system, at least partial automation of the operating sequences is made possible.

Advantageous configurations of the system are described in claims 2 to 18.

A refinement of the system as claimed in claim 2 is particularly advantageous, with the result that the positioning and packaging operation can be carried out fully automatically without any need for an operator. The packing density can be improved by a refinement of the system as claimed in claim 3 since, then, the region of greatest stressing, which is provided by the folds of the loops, is not restricted to the border region of the web-loop arrangement; rather, adjacent folds may be offset in relation to one another, this achieving a significant dissipation of the stressing at the border and allowing closer packing of the web loops. A significant improvement in the packing is achieved by the refinement as claimed in claim 4 since the length of the web per pack can be distributed uniformly over the web-loop arrangements and the individual web-loop arrangements thus also each have a uniform density. The web which is packaged in this way thus has constant properties over its entire length, such as uniform stressing throughout the arrangement, which, on the one hand, allows better utilization of the packaging container and, on the other hand, ensures uniform properties of the web, in particular for the subsequent further processing thereof. Elastic webs in particular can shrink together uniformly in the packaging container. The elasticity of the web is thus maintained uniformly over the entire length thereof since residual stressing in certain sections, which could result in material fatigue and a loss in elasticity, is avoided. A high-quality final product is thus made possible, all this with reduced manpower and increased performance.

The web positioned in loops has the tendency to straighten out in the folding region, as a result of which considerable forces occur in the web-loop arrangement, in particular in the folding region of the

web loops, and these counteract an ordered web-loop arrangement. An advantageous configuration of the system is thus one as claimed in claim 5, according to which the positioning device has, in the positioning region, a pressure-exerting bar which runs over the entire loop length, can be advanced perpendicularly to the bearing panel for the web-loop arrangement, can be pressed against the edges of the web loops and prevents the loops from opening up. The pressure-exerting bar is preferably provided with a controlled drive in order for this pressure-exerting bar to be raised up during transfer of the web-loop arrangement, and thus for the transfer to be facilitated.

A system as claimed in claim 7 is particularly expedient, in which case the transfer device has preferably finger-like pusher members on the infeed side of the web in the positioning device, it being possible for these pusher members to be displaced out of a rest position, in which the web feed is not impeded, into an operating position, in which these pusher members can be moved through beneath the pressure-exerting bar, parallel to the bearing panel of the web-loop arrangement, to be precise until, on the other side of the pressure-exerting bar, carry-along elements can be moved in between or behind the web-loop arrangements from a rest position in order to receive the web-loop arrangement and displace it into a receiving device transversely to the loop arrangement. The pusher members can be moved into the operating position from different positions, for example from a rest position beneath, to the side of or behind the bearing panel. A particularly preferred refinement, however, is the one as claimed in claim 8, in which the pusher members are moved vertically downward into the operating position from a raised rest position above the bearing panel. The same applies to the carry-along

elements behind the pressure-exerting bar, it likewise being possible for these carry-along elements to assume a wide variety of different rest positions to the side of and beneath the bearing panel. A particularly preferred refinement here is the one as claimed in claim 9, in which the carry-along elements are of finger-like design and can be moved in between the pusher members in the vertically downward direction from a top rest position. The web-loop arrangement is thus constantly controlled, either by the pusher members or by the carry-along fingers, throughout the transfer movement.

Also conceivable, however, is a simplified solution as claimed in claim 6, in which, rather than the pusher members being moved through beneath the pressure-exerting bar, the web-positioning operation takes place continuously and the web-loop arrangements are transported further downstream of the positioning device by means of blades arranged on a displacement bar. For this purpose, it is possible for the blades, in the first instance butting against one another, to be moved in between two web loops from above and then moved apart from one another laterally in order to separate two web loops and to transfer the web-loop arrangement located in front of them. In the case of this solution, the web-positioning operation need not be interrupted, as a result of which the productivity increases. However, this variant can only be used to process a very small number of straightforward and non-critical webs.

It is advantageous here if the system as claimed in claim 10 is designed such that the bearing panel for the web-loop arrangement has braking strips along the displacement path of the folds, from the positioning device into the receiving device. Ordered transfer is

also aided by the refinement as claimed in claim 11, according to which guide bars which guide the web-loop arrangement and are oriented transversely to the loop arrangement are arranged above the bearing panel. According to claim 13, at least one resiliently yielding stop member may be arranged in the receiving device, in the region between the folds, in order for web parts which curve forward in the receiving direction to be forced back, or oriented, parallel to the loop arrangement.

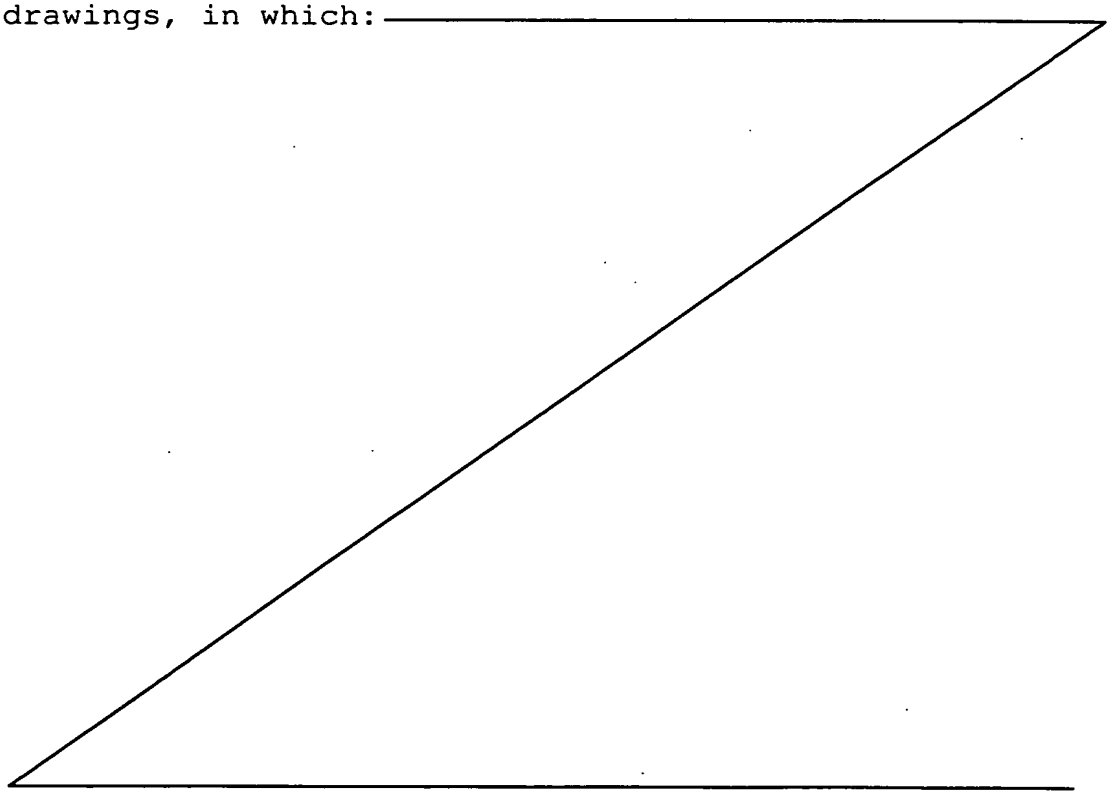
A packaging container may already be arranged in the receiving device in order to accommodate the web-loop arrangement. A more advantageous refinement, however, is one as claimed in claim 13, according to which a stacking device for the web-loop arrangements is arranged in the receiving device. It is thus possible for a plurality of web-loop arrangements located one above the other to be formed into a stack. According to claim 14, the stacking device contains a rear wall, which serves as a stop for the web-loop arrangement which is to be received, a base, which can be lowered to the thickness of the web-loop arrangement, and a cover, which can be adjusted in relation to the base and serves at least as a top guide for a web-loop arrangement which is to be transferred. According to claim 15, the cover serves as a top boundary of the stack and can additionally be displaced parallel with the base. The stacking of the web-loop arrangements is facilitated if, according to claim 16, the receiving device contains a retractable accommodating base which is preferably formed from two base halves which can be retracted in opposite directions.

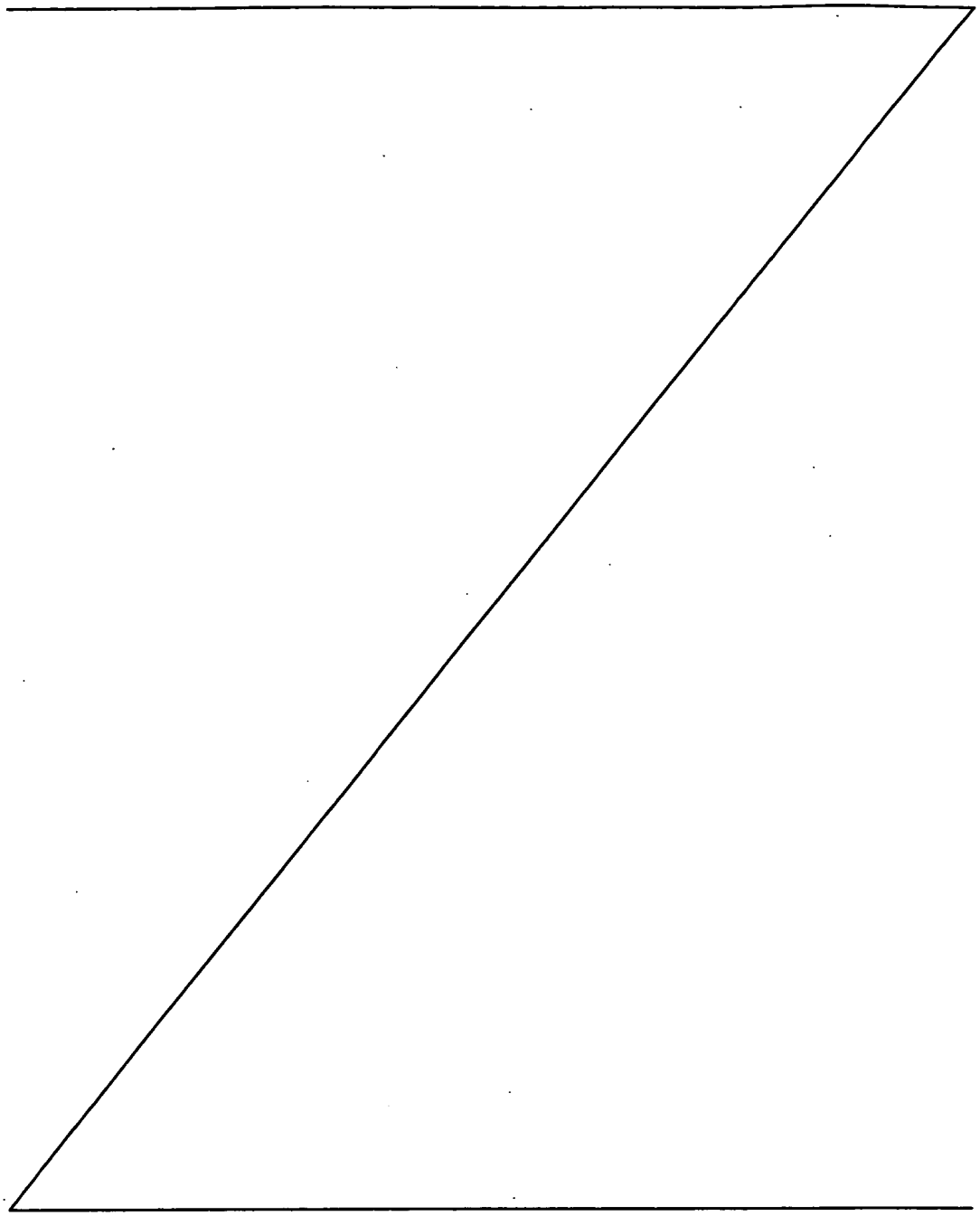
The stacking device of the system, as claimed in claim 17, can advantageously be lowered into a packing station in which the web-loop stack can be ejected out

of the stacking device, by means of an ejecting ram, into an associated packaging container. A particularly suitable packaging container is specified in claim 18. The packaging container contains a base with three side walls integrally formed on it and, on the fourth side, a side-wall part which can be swung downward, with the result that the web-loop stack can be pushed onto the base of the packaging container on this fourth side. The side-wall part can be swung upward in order to cover the fourth side of the filled packaging container. A cover is articulated on the side wall which is located opposite the fourth side, this cover having a wall part which at least largely covers the fourth side, this also ensuring that the pack is closed off satisfactorily on the fourth side.

Brief Description of the Drawings

Exemplary embodiments of the invention are described in more detail hereinbelow with reference to schematic drawings, in which:





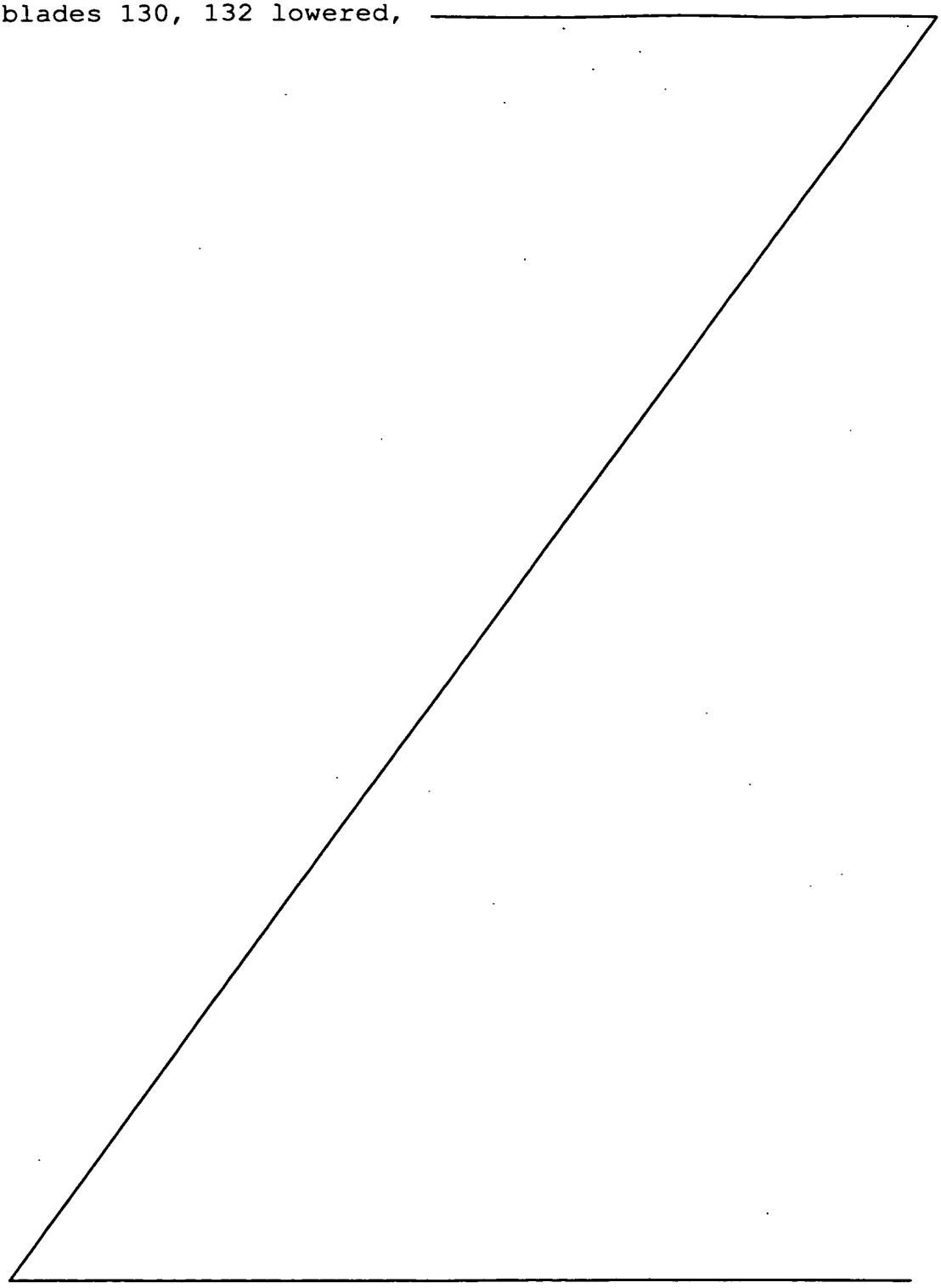
Figures 8 to 11 show schematic illustrations of a further simplified embodiment of a system for packaging a flexible web 2 which is positioned in zigzag-form loops. The same designations are used for features which are the same as those in the system from Figures 1 to 7. The schematically illustrated positioning device 1 corresponds to that from Figures 1 to 6.

The transfer device 26a, which is arranged downstream of the positioning device 1, has a displacement bar 124 which engages over the positioning region and is arranged on linear guides 126 on both sides of the positioning region such that it can be displaced in the X-direction by means of a drive 128, for example of a stepping motor connected to a linear gear mechanism. The displacement bar bears two blades 130, 132 which can each be moved in and out in relation to the web-loop arrangement 3 by means of a drive 134 and can be displaced along the displacement bar 124 by means of slides 136, 138. The drives 134 used for the blades are, for example, piston/cylinder subassemblies 140, of which the piston rods are designed as blades 130, 132. The slides 136, 138 can be displaced counter to one another in the Y-direction, that is to say transversely to the displacement direction of the displacement bar 124, out of a central position above the positioning region or the web-loop arrangement by means of a further drive 142, for example of a circulating pulling mechanism.

This system according to Figures 8 to 11 does not require any pusher members for pushing a web-loop arrangement through beneath the pressure-exerting bar; rather, it functions as follows.

In the first instance, a blade 130 is moved into the web-loop arrangement 3, passing out of the positioning device 1, at a predetermined location between a web loop 2a, and the displacement bar 124 is advanced in the X-direction until the web loop is opened. The first blade 130 is then raised again and the two blades 130, 132 are moved centrally into the opened web loop 2a and moved apart from one another in the Y-direction until they are spaced apart from the border of the web-loop arrangement by a distance corresponding approximately

to a quarter of the width of the web-loop arrangement, as is shown in Figure 10, this bringing the operation of separating the web loop to completion. With the blades 130, 132 lowered,



Patent Claims

1. A system for packaging a flexible web, in particular a textile web, which is positioned in zigzag-form loops, having a positioning device (1) which is arranged above a horizontal bearing panel (4) and contains a positioning carriage (6) which can be moved back and forth and has two positioning rollers (7, 8) which are arranged one beside the other, with axes parallel to one another, and are driven in rotation in the same direction and between which an individual web (2) can be drawn in from an infeed side (10) and can be folded by virtue of the positioning carriage (6) being moved back and forth perpendicularly to the drawing-in direction (X) of the web and can be moved on beneath the pressure-exerting bar (12) in a removal direction (X') corresponding to the drawing-in direction (X), characterized in that the positioning device (1) is assigned as transfer device (26, 26a) for forming a web-loop arrangement (3) of predeterminable magnitude and for transferring the web-loop arrangement (3) directly or indirectly into a packaging container (90), a memory-programmable control device for components of the system being provided.

2. The system as claimed in claim 1, characterized in that the control device is designed for controlling the system fully automatically.

3. The system as claimed in claim 1 or 2, characterized in that the length of the web loops can be adjusted to a different magnitude from web loop to web loop at the control device.

4. The system as claimed in one of claims 1 to 3, characterized in that it is possible to adjust the length of the web for each web-loop arrangement at the control device, it being possible, in the case of multi-arrangement packs, for the overall length of the web of the pack to be distributed preferably uniformly over all the arrangements.

5. The system as claimed in one of claims 1 to 4, characterized in that the positioning device (1) has, in the positioning region, a pressure-exerting bar (12) which extends over the entire loop length, can be advanced perpendicularly to a bearing panel (4) for the web-loop arrangement (3), can be pressed against the edges of the web loops (2a) of adjustable magnitude and is preferably provided with a controllable drive (20, 22) for raising it up during transfer.

6. The system as claimed in one of claims 1 to 5, characterized in that the transfer device (26a) has blades (130, 132) which are located downstream of the positioning device (1), are provided on a displacement bar (124) and are arranged such that they can be moved in between two web loops (2a) from above and moved apart laterally in order to separate two web loops and to transfer the web-loop arrangement (3) located in front of them.

7. The system as claimed in one of claims 1 to 5, characterized in that the transfer device (26) has preferably finger-like pusher members (28) on the infeed side of the web (2) in the positioning device (1), it being possible for these pusher members to be moved out of a rest position, in

which they do not impede the running of the web, into an operating position, in which they can be moved through beneath the pressure-exerting bar (12), parallel to the bearing panel (4) of the web-loop arrangement (3), until, on the other side of the pressure-exerting bar (12), carry-along elements (42) can be moved in between or behind the web-loop arrangement from a rest position in order for the web-loop arrangement (3) to be displaced into a receiving device (24), transversely to the loop arrangement, by means of the carry-along elements.

8. The system as claimed in claim 7, characterized in that the pusher members (28) can be lowered vertically into the operating position from a raised rest position above the bearing panel (4).

9. The system as claimed in claim 7, characterized in that the carry-along elements (42) are of finger-like design and can be moved in between the pusher members (28) in the vertically downward direction from a top rest position.

10. The system as claimed in one of claims 1 to 9, characterized in that the bearing panel (4) have braking strips (56) along the displacement path of the folds (2b, 2c) of the web loops (2a), from the positioning device (1) into the receiving device (24).

11. The system as claimed in one of claims 1 to 10, characterized in that guide bars (60) which guide the web-loop arrangement (3) and are oriented transversely to the loop arrangement are arranged above the bearing panel (4).

12. The system as claimed in one of claims 1 to 11, characterized in that at least one resiliently yielding stop member (62) is arranged in the receiving device (24), in the region between the folds (2b, 2c), in order for web parts which curve forward in the receiving direction to be oriented parallel to the loop arrangement (2a).

13. The system as claimed in one of claims 1 to 12, characterized in that the receiving device (24) is designed as a stacking device for the web-loop arrangements (3).

14. The system as claimed in claim 13, characterized in that the stacking device (24) has a rear wall (64), which serves as a stop for the web-loop arrangements (3) which are to be received, a base (66), which can be lowered by the thickness of the web-loop arrangements (3), and a cover (68), which can be adjusted in relation to the base (66) and serves at least as a top guide for a web-loop arrangement (3) which is to be transferred.

15. The system as claimed in claim 14, characterized in that the cover (68) can be displaced parallel to the base (66) as top boundary of the stack.

16. The system as claimed in one of claims 1 to 15, characterized in that it has, in the receiving device (24), an accommodating base (82) which can be retracted in the base plane and preferably comprises two base halves (84) which can be retracted laterally in opposite directions.

17. The system as claimed in one of claims 13 to 16, characterized in that the stacking device (24) can be lowered into a packing station in which the

web-loop stack can be ejected out of the stacking device (24), by means of an ejecting ram (88), into an associated packaging container (90).

18. The system as claimed in one of claims 1 to 17, characterized in that the packaging container (90) has a base (108) with three side walls (110, 112, 114) integrally formed on it, the fourth side, which serves for the introduction of the group of web loops, having a side-wall part (116) which can be swung downward, and a cover (118) being articulated on the opposite side wall, this cover having a border part (120) which at least largely covers the fourth side.

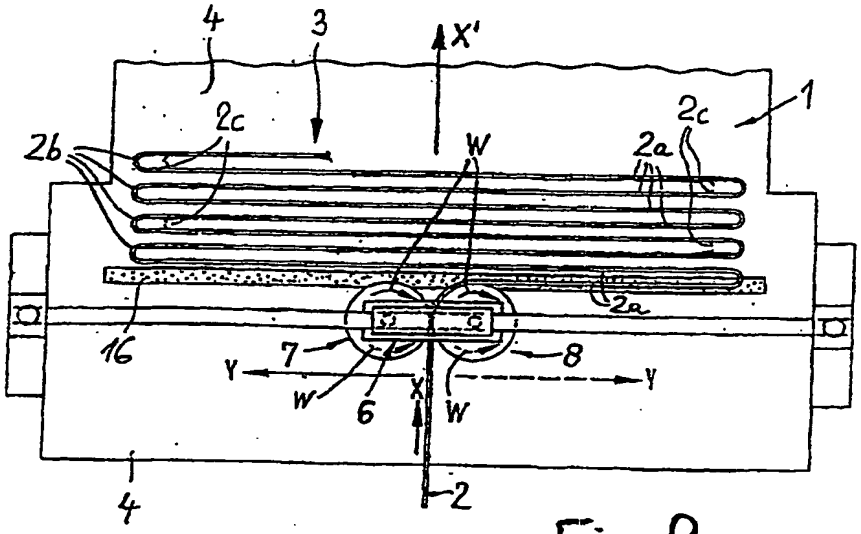


Fig.2

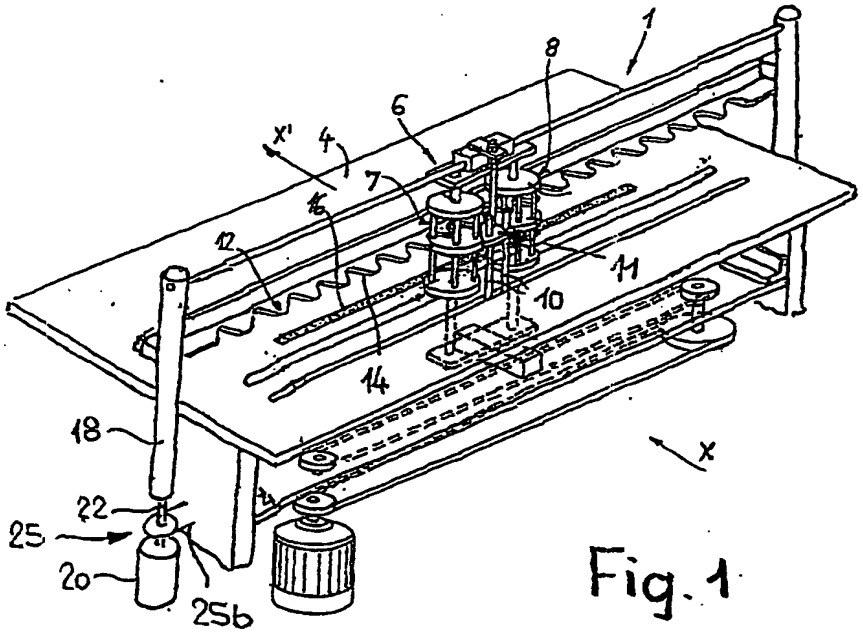


Fig.1

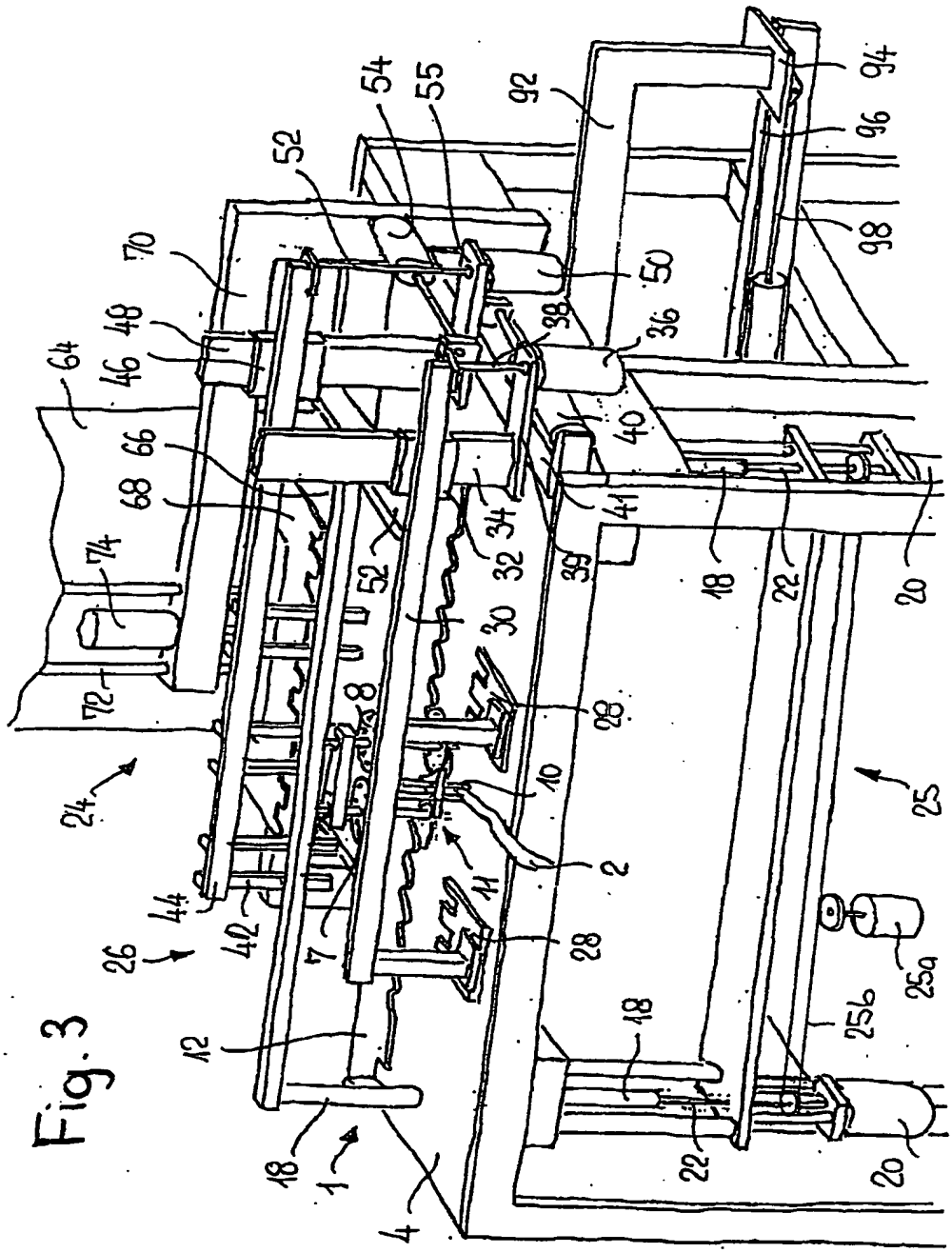


Fig. 3

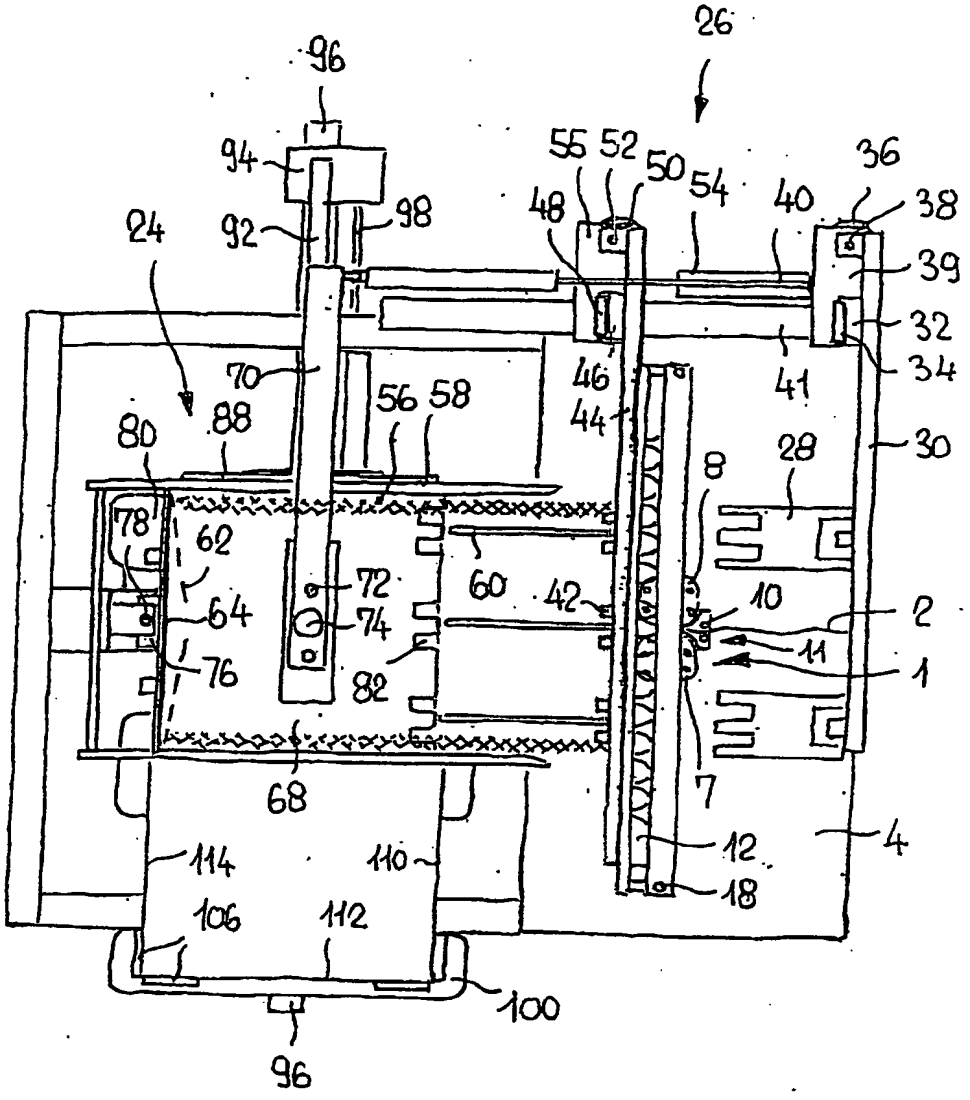


Fig. 4

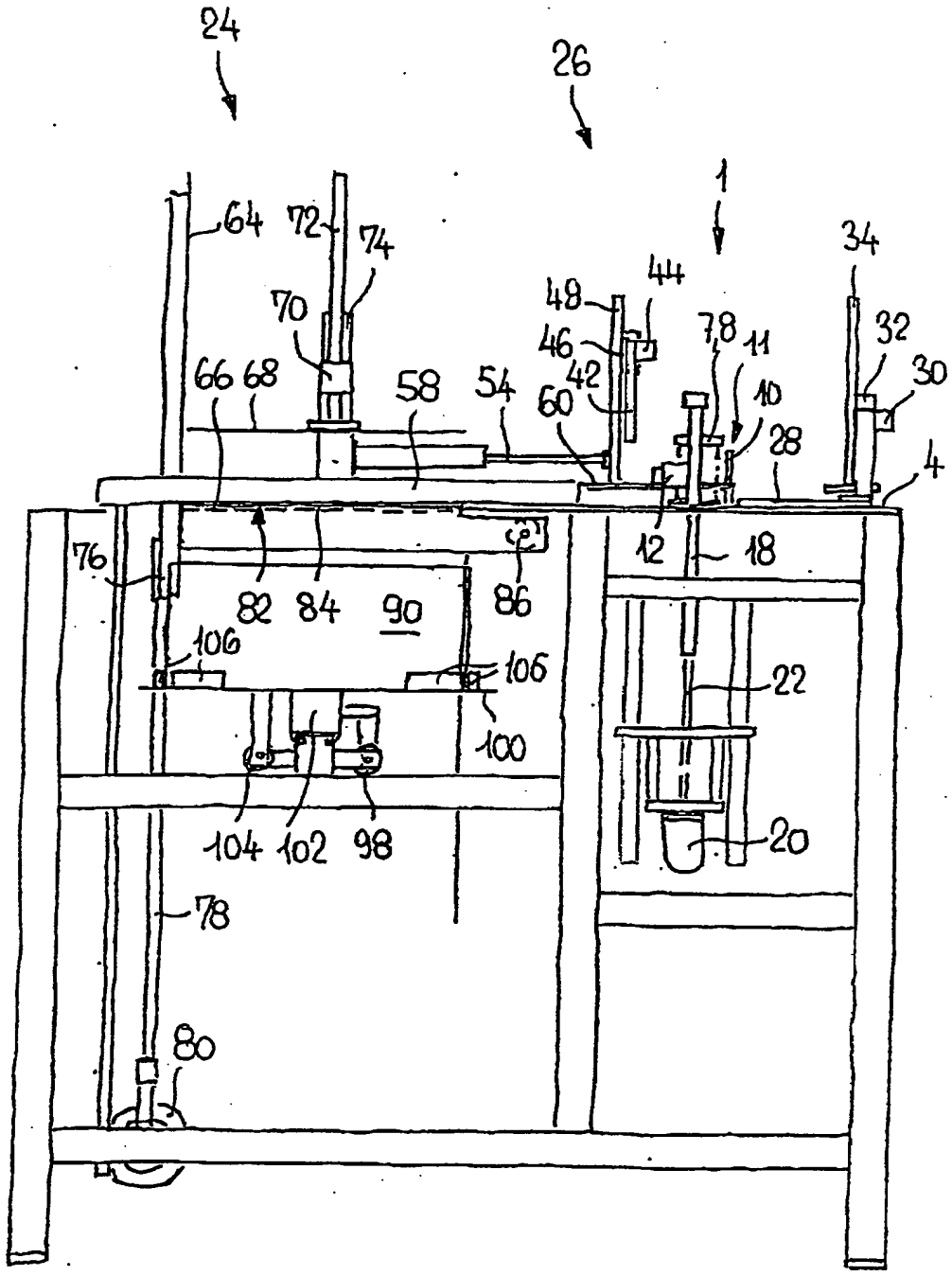

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Fig. 5

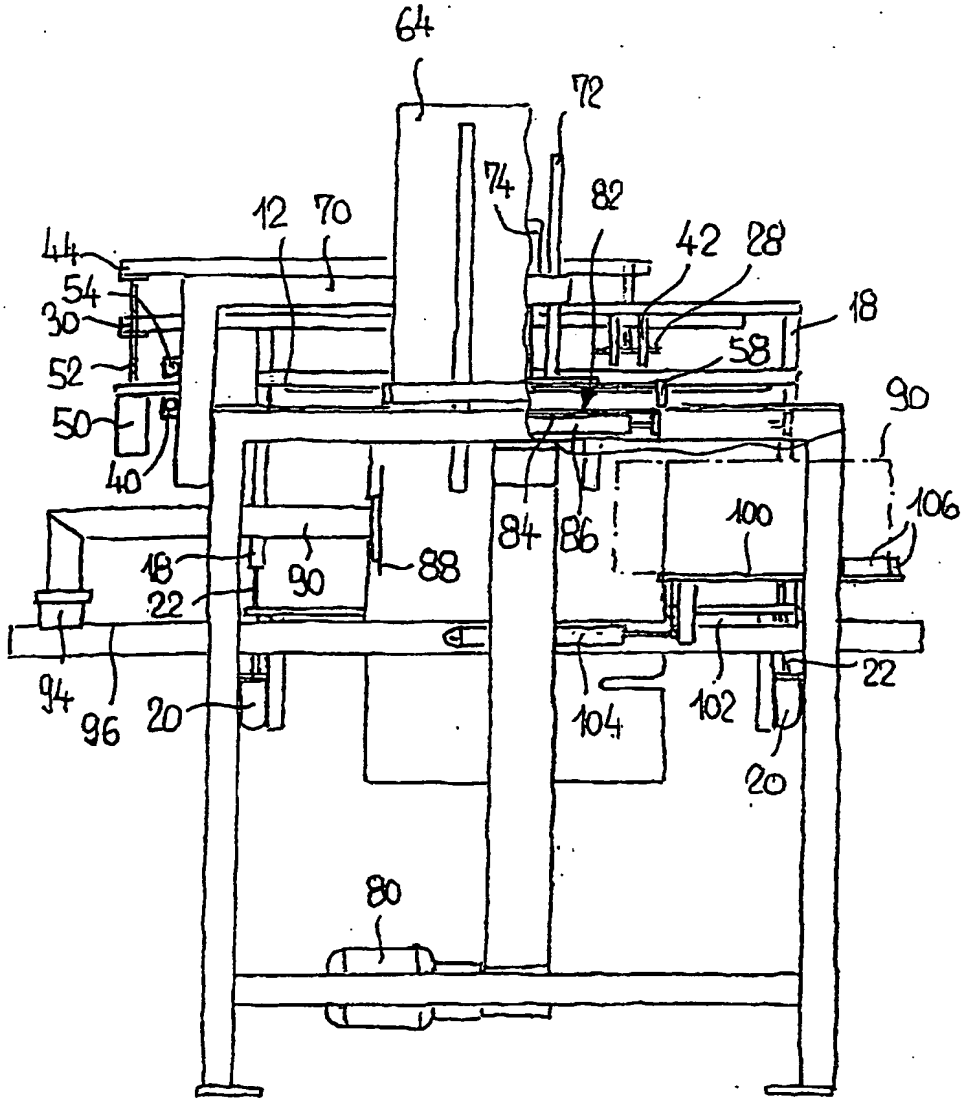
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Fig. 6

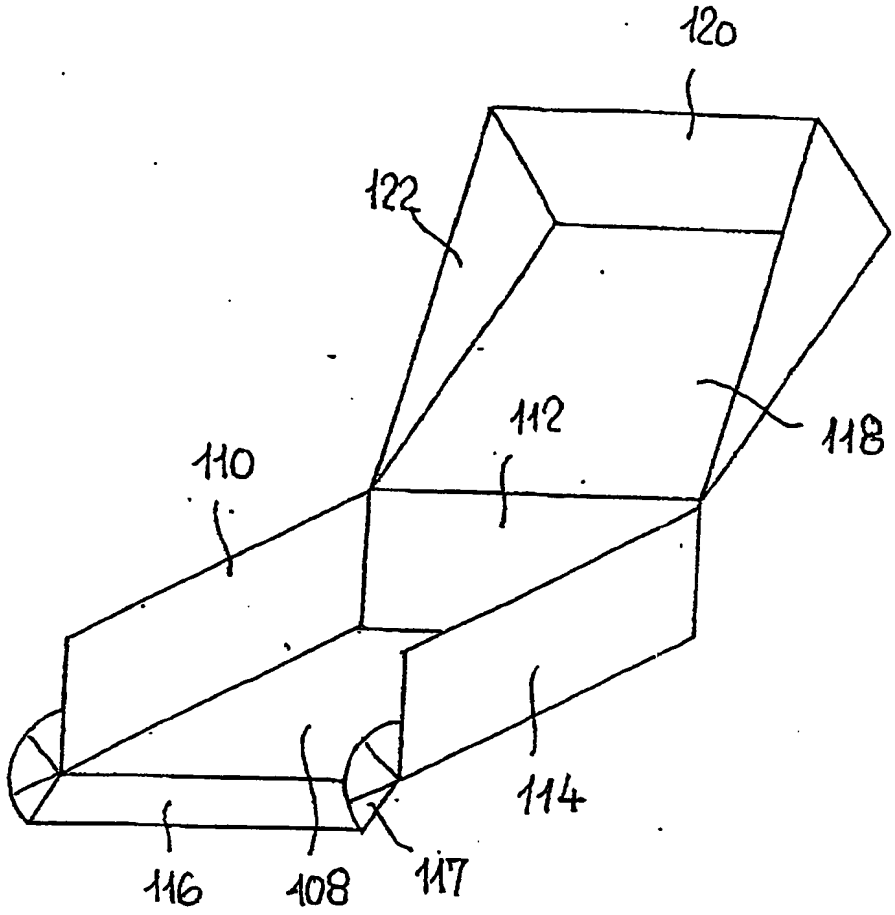

Fig. 7

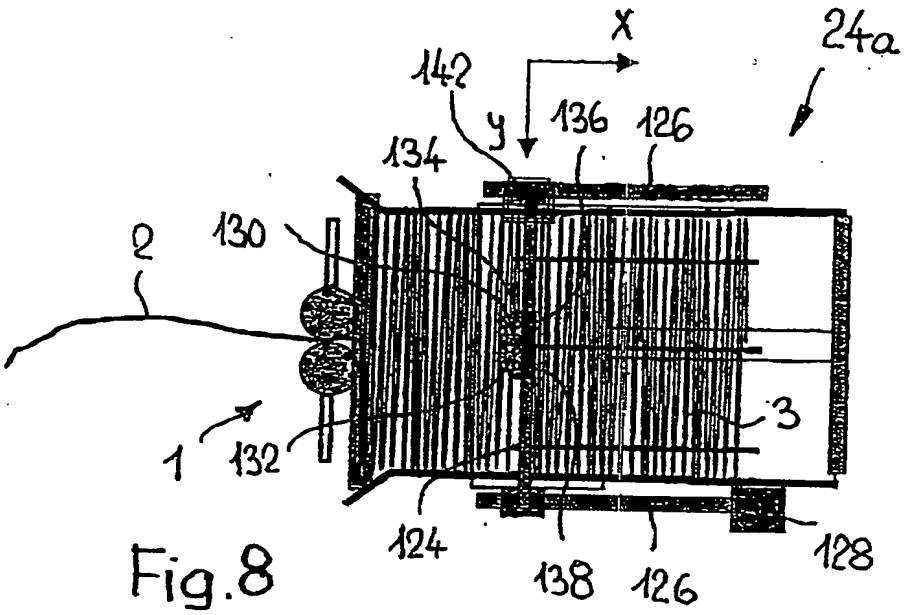

Fig.8

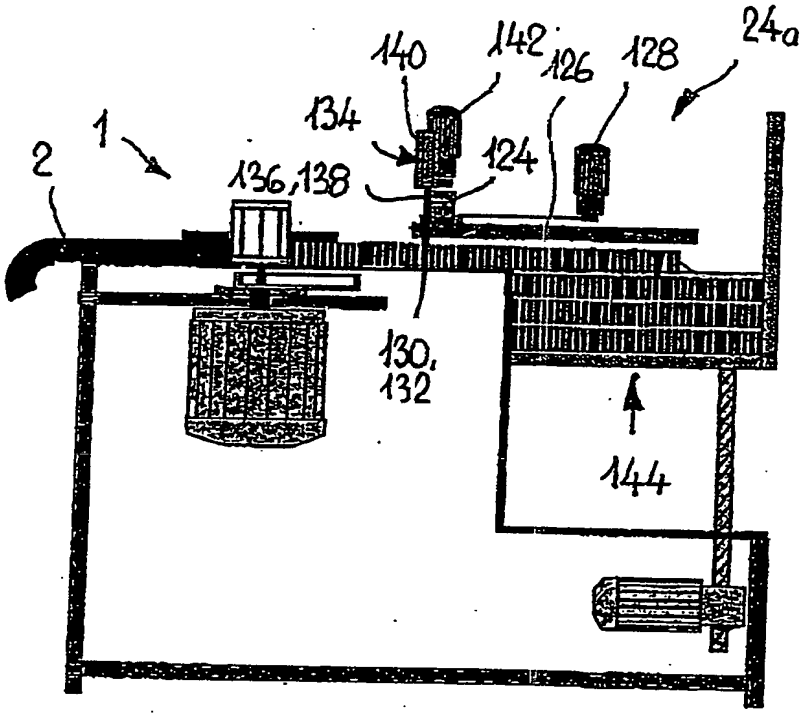

Fig.9

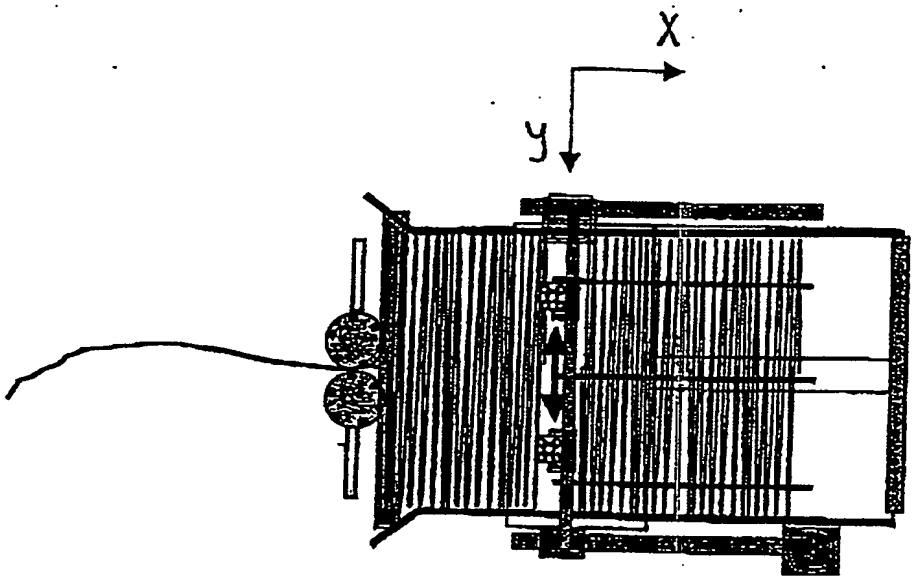

Fig. 10

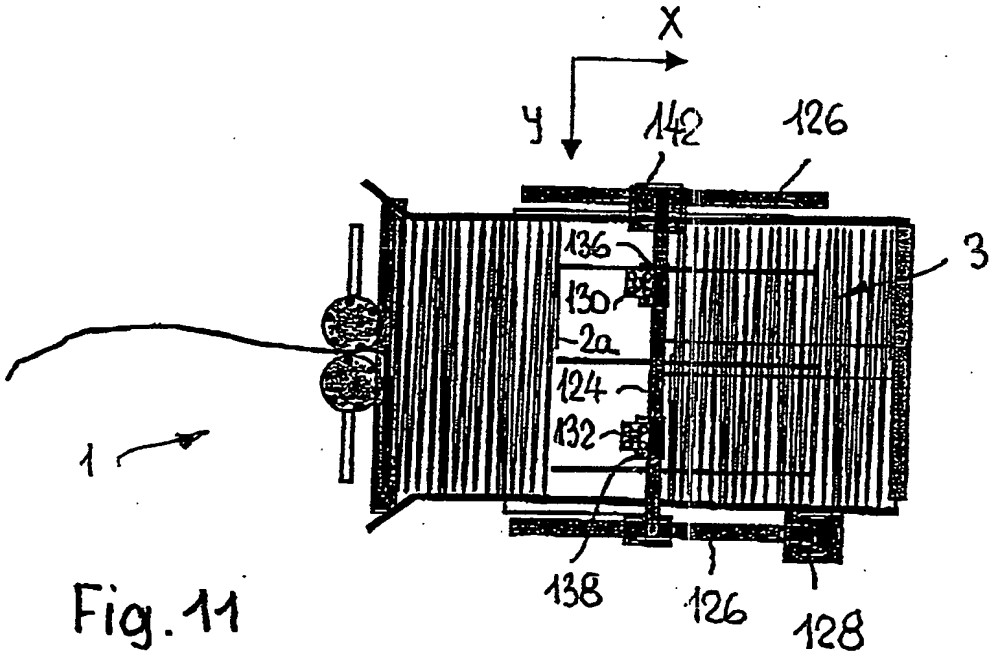

Fig. 11